

UNIT
4

The Wave Nature of Light



OVERALL EXPECTATIONS

DEMONSTRATE an understanding of the wave model of electromagnetic radiation.

PERFORM experiments relating to the wave model of light and applications of electromagnetic radiation.

ANALYZE light phenomena and explain how the wave model provides a basis for technological devices.

UNIT CONTENTS

CHAPTER 9 Wave Properties of Light

CHAPTER 10 Electromagnetic Waves



Is there life beyond Earth? It seems inconceivable that life has formed only on this planet, yet there is no direct evidence that there is life outside our own solar system. If civilizations exist in space, might they be discovered by electromagnetic radiation monitoring from here on Earth?

The Search for Extraterrestrial Intelligence (SETI) program, a range of research projects dedicated to the search for intelligent life beyond Earth, is investigating this possibility. Using the world's largest radio telescope, located in Arecibo, Puerto Rico (shown in the photograph), the sky is scanned around the clock for non-natural electromagnetic signals. SETI research projects attempt to answer questions, such as: How many stars might have planets? And of those planets, how many have environments that could support life?

Developing an understanding of electromagnetic radiation has provided modern civilization with a powerful communication tool. This unit will introduce the theoretical framework that predicted the existence of electromagnetic waves, how these waves (including light) are produced and detected, their properties, and some applications in modern society.

UNIT PROJECT PREP

Refer to pages 454–455. In this unit project, you will have the opportunity to build and test an FM transmitter.

- How will an understanding of a wave model for electromagnetic radiation help you to understand FM transmission?
- What properties of electromagnetic waves will be easiest to verify using your transmitter?